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Three new species and one new record of *Ampulex* Jurine (Hymenoptera, Ampulicidae) from China, with a key to Chinese species

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Abstract

The taxonomy of the genus *Ampulex* in China is studied, three new species from Yunnan, Fujian, Guangdong, and Guangxi Provinces are described: *Ampulex fronticarinalis* Liu & Li, **sp. nov.**, *Ampulex genapunctata* Liu & Li, **sp. nov.**, and *Ampulex rubifemoralis* Liu & Li, **sp. nov.** Additionally, *Ampulex tridentata* Tsuneki, 1982 is recorded from China, and the female of *Ampulex clypecomplana* Chen and Q. Li, 2010 is described for the first time. An identification key and a checklist of the Chinese species of *Ampulex* are provided.

Keywords

Ampulex, Ampulicidae, cockroach wasp, identification key, taxonomy

Introduction

Ampulicidae is one of several families in Apoidea, and *Ampulex* is the genus with the largest number of species in this family. To date, the genus *Ampulex* comprises 134 recognized species and four subspecies worldwide. It exhibits a broad distribution, spanning all major biogeographical regions. Aside from the widely distributed species *Ampulex compressa* (Fabricius, 1781), which is found in various regions, there are primarily 59 species distributed in the Oriental region and 47 species in the Afrotropical region. Six species

are shared between the Oriental and Palaearctic regions, while fewer species are present in the Palaearctic (8), Neotropical (14), and Australasian (1) regions (Thunberg 1822; Kohl 1893; Strand 1913; Matsumura and Uchida 1926; Berland 1935; Yasumatsu 1936; Tsuneki 1967, 1973; Nagy 1972; Ohl and Spahn 2010; Ohl et al. 2014; Anagha and Girish Kumar 2019; Kim 2020; Pulawski 2024). As for China, 24 species are currently known (Wu and Zhou 1996; Hua 2006; Chen and Li 2010; Pulawski 2024).

This study provides detailed descriptions and photographic records of three new species from China, documents one new record of species from China, and presents a key to the Chinese species of the genus *Ampulex*.

Material and methods

The specimens examined during this study were collected from Yunnan, Fujian, Guangxi and Zhejiang Provinces in China, and deposited in the Insect Collection of Yunnan Agricultural University, Kunming, P. R. China (YNAU). The specimens were observed and illustrated using an Olympus stereomicroscope (SZ Series) with an ocular micrometer. The photographs were taken with VHX-5000.

The known species listed in the checklist and their distribution information are derived from literature records on the Catalog of Sphecidae website (https://www.calacademy.org/scientists/projects/catalog-of-sphecidae) (Pulawski, 2024), as well as from accurately identified specimens collected by us from various regions of China.

The abbreviations in the text are as follows: EW, eye width (frontal view, maximum); ID, interocular distance (dorsal view, minimum); F, flagellum; S, metasomal sternum; T, metasomal tergum; rs-m, the vein between adjacent submarginal cells in forewing. Size and density of punctures: small or fine, puncture diameter less than 0.1× hindocellar diameter; midsize, 0.1–0.25× hindocellar diameter; large, more than 0.25× hindocellar diameter; dense, puncture diameter less than 5× average distance between punctures; sparse, more than 5× average distance between punctures.

Taxonomy

Genus *Ampulex* Jurine, 1807

Ampulex Jurine, 1807: 132. Type species: *Chlorion compressum* of Latreille and of Fabricius [= *Chlorion compressum* (Fabricius, 1804) = *Sphex compressus* Fabricius, 1781, designated by Audouin, 1822: 301 (see Pate, 1946: 101).

Pronaeus Latreille, 1809: 56. Type species: *Dryinus aeneus* Fabricius, 1804, designated by Latreille, 1810: 438. Synonymized with *Ampulex* Jurine by Pate, 1935: 247.

Lorrhoeum Shuckard, 1837: 18. Type species: *Chlorion compressum* (Fabricius, 1804) [= *Sphex compressus* Fabricius, 1781], by original designation and monotypy.

Rhinopsis Westwood, 1844: 68. Type species: *Rhinopsis abbotti* Westwood, 1844 [= *Ampulex canaliculata* Say, 1823, by monotypy.

Waagenia Kriechbaumer, 1874: 55. Type species: *Waagenia sikkimensis* Kriechbaumer, 1874, by monotypy.

Chlorampulex de Saussure, 1892: 441. Type species: *Sphex compressus* Fabricius, 1781, designated by Pate, 1937: 18.

Diagnosis. Body size small to large. Surface of body often with bright metallic color, few species black or red. Female mandible long and curved, inner edge tooth lacks generally; male mandible normal, inner edge with one single tooth and varies greatly. Female clypeus strongly elevated, with median longitudinal ridge, beak-like; anterior margin with several teeth and varies greatly; male clypeus normal. Two antennal sockets separated, each covered above base by one frontal lobe. Pronotum broad, shorter or longer than mesonotum; propleurum with one narrow, transverse groove. Mesonotum wide and convex; notaulus deep and long; posterior side of mesoscutum depressed deeply. Mesopleuron with omaulus generally; sternaulus present or lacked. Propodeum nearly rectangular, with one median longitudinal carina and several lateral carinae converged posteriorly, connected by numerous regular transverse rugae; posterior surface vertical; posterior lateral angles distinct generally; lateral surface reticulate. Metanotum Y-shaped. Forewing with 2–3 submarginal cells, vein 1m-cu received by first submarginal cell, vein 2m-cu received by third submarginal cell (if only two submarginal cells present, it received by second submarginal cell); apex of marginal cell bent away from wing margin; vein M+Cu diverged at or just before crossvein cu-a. Hindwing with vein M+Cu diverging either before, at, or after crossvein cu-a; jugal lobe lacked. Claw with one inner tooth, shape of tooth varied. Metasomal petiole composed of S1, S2 features one deep basal transverse groove (Bohart and Menke 1976).

Biology. *Ampulex* comprises solitary predatory wasps that prey on various cockroaches. Adults are most active during sunny weather, often searching for prey or mates around tree trunks, leaf litter, and shrubs, and sometimes even entering human habitats. Field observations have revealed that adults primarily feed on nectar, honeydew, tree sap, and fruit juices. When capturing prey, *Ampulex* wasps first bite onto the body of the cockroach with their mandibles and bend metasoma, and then sting the prey repeatedly below thorax and neck to paralyze it. *Ampulex* wasps are skilled at utilizing any suitable existing cavities for nesting, such as soil burrows, hollow plant stems, crevices in rocks, and tree holes. After paralyzing the prey, the wasp uses its mandibles to grasp the base of the cockroach's antennae and drags the prey backward into the nest, where it lays eggs on the prey's body and seals the entrance using debris of various materials to complete the nesting process. The larvae, once hatched, feed on the paralyzed prey for development. After completely consuming the prey, they pupate and spin a cocoon. After maturing, they break out of the cocoon. Often, after paralyzing the prey, female *Ampulex* wasps will bite off the cockroach's antennae to feed on the bodily fluids that flow from the broken antennae (Williams 1929, 1942).

Key to Chinese species of the genus *Ampulex* Jurine, 1807

Females are unknown for *A. albobarbata* Tsuneki, 1982; *A. alisana* Tsuneki, 1967; *A. cuprea* F. Smith, 1856; *A. murotai* Tsuneki, 1973; *A. sciophanes* (Nagy, 1971). Males are unknown for *A. bidenticollis* Tsuneki, 1967; *A. dentata* Matsumura & Uchida, 1926; *A. esakii* Yasumatsu, 1936; *A. genapunctata* sp. nov.; *A. longiabdominalis* Wu & Chou, 1985; *A. sikkimensis* (Kriechbaumer, 1874))

1 Female (antennae twelve segments; metasomal apex laterally compressed) **2**
– Male (antennae thirteen segments; metasomal apex not compressed laterally) **24**
2 Body black or black with red; forewing with two submarginal cells....**3**
– Body metallic blue, green, or purple; forewings with two or three submarginal cells....**8**
3 Thorax largely bright red; metasoma bright yellow....
....***A. yunnanensis* Wu & Chou, 1985**
– Thorax and metasoma wholly black....**4**
4 Mid and hind femora red; T3 and hind coxa dorsally covered with dense, silvery setae....***A. rubifemoralis* sp. nov.**
– Mid and hind femora black; T3 and dorsal hind coxa without silvery seta..**5**
5 Lateral margin of clypeus with one triangular notch ....
....***A. sonani* Yasumatsu, 1936**
– Lateral margin of clypeus without notch....**6**
6 Anterior part of pronotal collar with two tubercles....
....***A. bidenticollis* Tsuneki, 1967**
– Anterior part of pronotal collar without tubercle 7
7 Eyes small, nearly round, EW distinctly shorter than ID; pronotum and thorax with midsized to large punctures...***A. rotundioculus* Wu & Chou, 1985**
– Eyes large, oval-shaped, EW distinctly shorter than ID; pronotum and thorax with fine punctures....***A. esakii* Yasumatsu, 1936**
8 Median ridge of clypeus bifurcating close to apex **9**
– Median ridge of clypeus not bifurcating close to apex....**11**
9 Pronotal collar with fine punctures; without median longitudinal groove .....
....***A. dentata* Matsumura & Uchida, 1926**
– Pronotal collar with large punctures; with median longitudinal groove **10**
10 Mid and hind femora metallic blue; frons above base of median ridge of clypeus with a short, impressed groove ....***A. difficilis* Strand, 1913**
– Mid and hind femora red; frons without groove .....***A. latifrons*** Kohl, 1893
11 Forewing with two submarginal cells **12**
– Forewing with three submarginal cells, vein 1rs-m sometimes incomplete ...**17**
12 Clypeus very long, equal to half of head length; body with red spots **13**
– Clypeus relatively short, shorter than half of head length; body without red spots **14**

13 Clypeus red, lateral margin straight..... ***A. mirabilis*** **Berland, 1935**
– Clypeus black, lateral margin serrated....***A. longiclypeus*** **Wu & Chou, 1985**
14 Posterior margin of pronotal collar with tubercle **15**
– Posterior margin of pronotal collar without tubercle **16**
15 Gena with tubercle; mid and hind femora red.....
.....***A. sikkimensis*** **(Kriechbaumer, 1874)**
– Gena without tubercle; mid and hind femora metallic blue-green.....
..... ***A. seitzii*** **Kohl, 1893**
16 Anterior margin of clypeus with five teeth; pronotal collar with several strong, transverse rugae.....***A. clypecomplana*** **Chen and Q. Li, 2010**
– Anterior margin of clypeus with three teeth; pronotal collar with many slender, transverse rugae.....***A. dissector*** **(Thunberg, 1822)**
17 Forewing vein 1rs-m complete **18**
– Forewing vein 1rs-m incomplete.....**21**
18 Frontal carina originating from each frontal lobe not extended or enclosed into an elliptical area; posterior margin of pronotal collar without tubercle **19**
– Frontal carina originating from each frontal lobe extended and enclosed into an elliptical area, including anterior ocellus; posterior margin of pronotal collar with one tubercle **20**
19 Anterior margin of clypeus with three teeth; mandible red; sternaulus absent
.....***A. longiabdominalis*** **Wu & Chou, 1985**
– Anterior margin of clypeus with five teeth; mandible reddish-brown only at apex and inner edge; sternaulus present .....***A. genapunctata*** **sp. nov.**
20 Mid and hind femora red; pronotal collar with several strong, transverse rugae.....***A. compressa*** **(Fabricius, 1871)**
– Mid and hind femora metallic blue; pronotal collar with few weak, transverse rugae.....***A. kurarensis*** **Yasumatsu, 1936**
21 Mid and hind femora red or only hind femora red.....**22**
– Mid and hind femora metallic blue or green **23**
22 Frontal carina originating from each frontal lobe not extended or enclosed into an elliptical area; only hind femora red....***A. quadraticollar*** **Wu & Chou, 1985**
– Frontal carina originating from each frontal lobe extended and enclosed into an elliptical area, including anterior ocellus; mid and hind femora red.....
.....***A. fronticarinalis*** **sp. nov.**
23 Width of pronotal collar longer than its length; msdian anterior part of pronotal collar depressed, antero-lateral corners appearing roundly swollen .....
.....***A. takeuchii*** **Yasumatsu, 1936**
– Width of pronotal collar nearly equal to its length; median anterior part of pronotal collar slightly depressed, antero-lateral corners flat.....
.....***A. tridentata*** **Tsuneki, 1982**
24 Body black or black with red; forewing with two submarginal cells.....**25**
– Body metallic blue, green, or purple; forewings with two or three submarginal cells **30**

25 Thorax with a large area of bright red spots; metasoma bright yellow ..... ***A. yunnanensis*** **Wu & Chou, 1985**

– Thorax and metasoma completely black **26**

26 Mid and hind femora red; hind coxa densely covered with silvery setae dorsally ..... ***A. rubifemoralis*** **sp. nov.**

– Mid and hind femora black; hind coxa without silvery seta dorsally **27**

27 Anterior margin of pronotum with a deep transverse groove ..... ***A. alisana*** **Tsuneki, 1967**

– Anterior margin of pronotum without concave **28**

28 Frons above base of median ridge of clypeus without tubercle ..... ***A. murotai*** **Tsuneki, 1973**

– Frons above base of median ridge of clypeus with tubercle **29**

29 Anterior half of scutum with median longitudinal groove ..... ***A. rotundioculus*** **Wu & Chou, 1985**

– Anterior half of scutum without median longitudinal groove ..... ***A. sonani*** **Yasumatsu, 1936**

30 Forewing with two submarginal cells **31**

– Forewing with three submarginal cells, vein 1rs-m sometimes incomplete **39**

31 Mid and hind femora red or only hind femora red **32**

– Mid and hind femora metallic blue or green **34**

32 Mid and hind femora red; propodeal median longitudinal carina incomplete ..... ***A. latifrons*** **Kohl, 1893**

– Only hind femora red; propodeal median longitudinal carina complete **33**

33 Anterior margin of clypeus truncate, with one blunt tooth medially; vertex with dense, irregular reticulation .. ***A. clypecomplana*** **Chen and Q. Li, 2010**

– Anterior margin of clypeus slightly arc-shaped prominent, with one distinct tooth medially; vertex with dense, small to midsized punctures ..... ***A. dissector*** **(Thunberg, 1822)**

34 Body with red areas **35**

– Body without red areas **36**

35 Clypeus red, surface without irregular rugae ..... ***A. mirabilis*** **Berland, 1935**

– Clypeus black, surface with irregular rugae .. ***A. longiclypeus*** **Wu & Chou, 1985**

36 Posterior margin of pronotal collar with tubercle ..... ***A. seitzii*** **Kohl, 1893**

– Posterior margin of pronotal collar without tubercle **37**

37 Pronotal collar without transverse rugae ..... ***A. difficilis*** **Strand, 1913**

– Pronotal collar with transverse rugae **38**

38 Proximal part of lateral margin of clypeus without notch ..... ***A. sciophanes*** **(Nagy, 1971)**

– Proximal part of lateral margin of clypeus with notch ..... ***A. cuprea*** **F. Smith, 1856**

39 Frontal carina originating from each frontal lobe present, extended and enclosed into an elliptical area, including anterior ocellus **40**

– Frontal carina originating from each frontal lobe present, not extended or enclosed into an elliptical area **43**

40	Mid and hind femora red **41**
–	Mid and hind femora metallic blue or green **42**
41	Pronotal collar with transverse rugae and tubercle on posterior margin; 1rs-m on forewing vein complete ..... ***A. compressa* (Fabricius, 1871)**
–	Pronotal collar without transverse rugae or tubercle; 1rs-m on forewing vein incomplete ..... ***A. fronticarinalis* sp. nov.**
42	Vertex with median longitudinal groove; pronotal collar with transverse rugae ..... ***A. kurarensis* Yasumatsu, 1936**
–	Vertex without median longitudinal groove; pronotal collar without transverse rugae ..... ***A. albobarbata* Tsuneki, 1982**
43	Hind femora red ..... ***A. quadraticollar* Wu & Chou, 1985**
–	Hind femora metallic blue or green **44**
44	Body with large and dense punctures, resembling irregular, reticular ridges... ..... ***A. takeuchii* Yasumatsu, 1936**
–	Body with midsize and scattered punctures, not resembling irregular, reticular ridges ..... ***A. tridentata* Tsuneki, 1982**

1. *Ampulex fronticarinalis* Liu & Li, sp. nov.

https://zoobank.org/5ADD2D4F-BAEE-43AA-A362-8E610C3A3AB5

Figs 1, 2

Type material. ***Holotype.*** • ♀, **China, Yunnan**, Xishuangbanna, Jinghong: Naban River, 22.1343°N, 100.7181°E; 2011.VII.19, coll. Qiang Li.

Paratypes. • 2 ♂♂, **China, Yunnan**, Xishuangbanna, Mengla County, Baka Village, 21.8974°N, 101.3295°E, 2019.IV.26, coll. Yi He; • 1 ♀, **China, Yunnan**, Xishuangbanna, Menghai County, 21.8639°N, 101.2366°E, 1982.X.3, coll. Zongqi Chen. All type specimens are deposited in the Insect Collection of Yunnan Agricultural University, Kunming, P. R. China (YNAU).

Diagnosis. The new species resembles *A. quadraticollar* Wu & Chou, 1985 in having pronotal collar nearly square, vein 1rs-m incomplete and female clypeus with three teeth on anterior margin. It differs by the following characteristics (characters of *A. quadraticollar* in parentheses): frontal carina originating from each frontal lobe present, extended and enclosed into an elliptical area, including anterior ocellus (frontal carina originating from each frontal lobe present, not extended or enclosed into an elliptical area); pronotum with one median longitudinal carina (pronotum without median longitudinal carina); four propodeal posterior lateral angles evident (two propodeal posterior lateral angles evident); mid and hind femora red (only hind femora red).

Description of female. Body length 21–23 mm. Body with bright metallic blue-green and purple luster. Mandible apically reddish brown, remainder dark brown. Antennae black. Wings hyaline, smoky brown; veins and stigma dark brown. Mid and hind femora red except for distal part; tarsi dark brown. Head and mesosoma densely covered with pubescence.

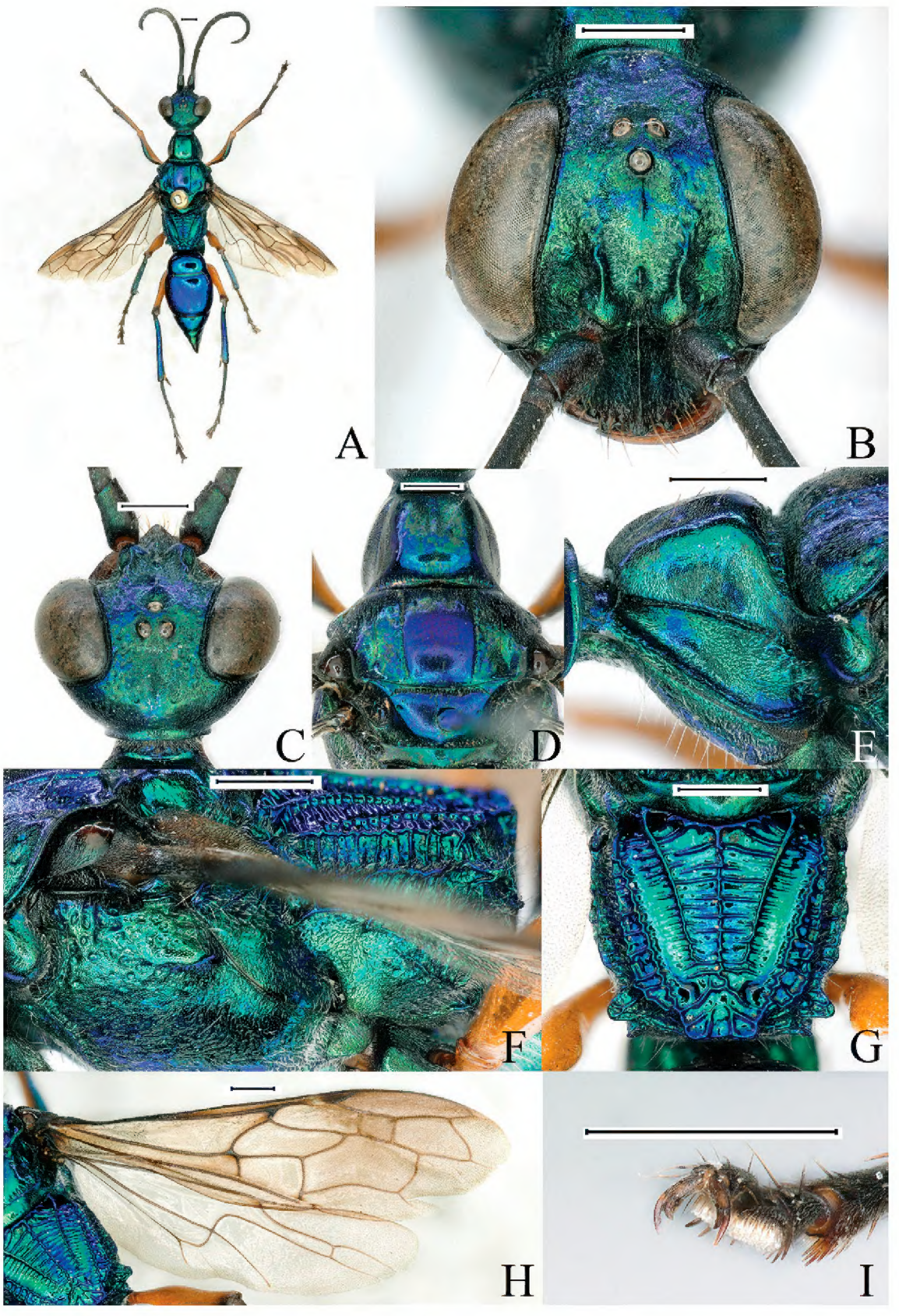

Figure 1. *Ampulex fronticarinalis* Liu & Li, sp. nov. Female. Holotype **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

Head. Mandible sharp at apex; inner edge blade-like, without inner teeth (Fig. 1B). Clypeus beak-like, anterior margin with three teeth (Fig. 1B). Terminal segment of labial palpus normal. Frons with dense, fine punctures; frontal carina originating from each frontal lobe present, extended and enclosed into an elliptical area, including anterior ocellus (Fig. 1B). Frontal line long, incomplete (Fig. 1B). Vertex with median longitudinal groove, with dense, fine punctures (Fig. 1C). Gena with dense, fine punctures. Ratio of EW: ID = 29: 15. Ratio of F1: (F2+F3) = 17: 21.

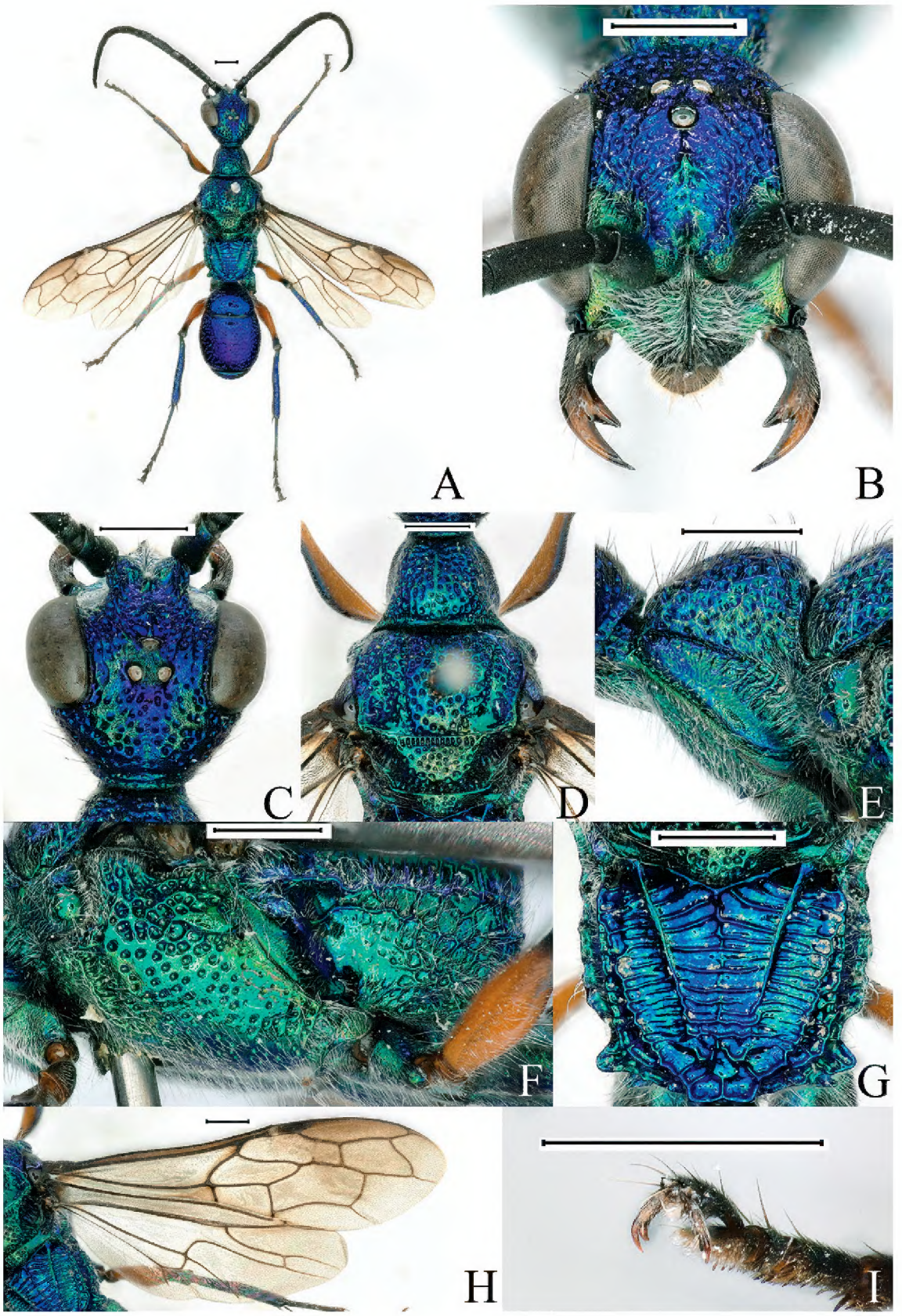

Figure 2. *Ampulex fronticarinalis* Liu & Li, sp. nov. Male. Paratype **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

Mesosoma. Pronotal collar nearly square, with dense, fine punctures and one median longitudinal carina (Fig. 1D); propleurum with dense, fine punctures, and with one transverse, narrow groove, posteriorly with several short, oblique rugae on each side (Fig. 1E); prosternum with dense, fine punctures. Scutum with dense, fine punctures; notaulus long, extending to posterior margin, crenulate (Fig. 1D). Mesopleuron with dense, fine punctures and sparse, large punctures (Fig. 1F). Mesosternum with dense, fine punctures and sparse, large punctures (Fig. 1F). Omaulus crenulate (Fig. 1F). Sternaulus absent

(Fig. 1F). Scutellum with dense, fine punctures; anterior margin with one transverse, crenulate groove (Fig. 1D). Metanotum with dense, fine punctures (Figs 1D, G). Propodeal enclosure approximately trapezoid, medially with five strong, longitudinal carinae, including one median longitudinal carina, two strong, oblique, longitudinal carinae on either side, and two serrated oblique, longitudinal carinae located further out to sides, numerous nearly parallel transverse rugae connected five carinae and edge carinae on either side, forming distinct, regular reticulation except posterior central part with irregular reticulation; transverse rugae incomplete between two oblique, longitudinal carinae on both sides (Fig. 1G). Posterior surface of propodeum with distinct, irregular reticulation. Upper part of lateral surface of propodeum with irregular reticulation, rest smooth, nearly not punctate (Fig. 1F). Four propodeal posterior lateral angles evident (Fig. 1G).

Wings and legs. Fore wings with three submarginal cells, vein 1rs-m incomplete; vein M+Cu diverging before crossvein cu-a. Hind wings with vein M+Cu diverging at crossvein cu-a (Fig. 1H). Claws bifid (Fig. 1I).

Metasoma. T1-T2 with sparse, fine punctures; T3-T6 alutaceous, with dense, fine punctures. T2 with one transverse groove near anterior margin. Metasomal apex laterally compressed.

Male. Differs from female as follows: Body length 18–20 mm. Mandible short, black, with one large inner tooth (Fig. 2B). Clypeus approximately trapezoidal, covered with dense, white long setae; anterior margin truncate, with one distinct tooth medially (Fig. 2B). Frons with dense, large punctures, and approximately irregular reticulation (Fig. 2B). Ratio of EW: ID = 48: 31. Ratio of F1 : (F2+F3) = 15 : 22. Vertex, gena, pronotal collar, prosternum, scutum, mesopleuron, mesosternum, scutellum and metanotum with dense, large punctures (Figs 2B-F). Propleurum with more and longer oblique ruga posteriorly on each side (Fig. 2E). Propodeal enclosure with complete transverse rugae between two oblique, longitudinal carinae on both sides (Fig. 2G). Lateral surface of propodeum almost entirely with irregular reticulation. Hind wings with vein M+Cu diverging before crossvein cu-a (Fig. 2H). Metasomal apex not compressed laterally (Fig. 2A); T1-T3 with dense, large punctures.

Distribution. China (Yunnan).

Etymology. The specific name *fronticarinalis* originates from the Latin stem "*front*" and "*carina*" with the ending "*alis*" meaning "belonging to", refers to frons with carina originating from each frontal lobe extended and enclosed into an elliptical area, including anterior ocellus.

2. *Ampulex genapunctata* Liu & Li, sp. nov.

https://zoobank.org/45DE7DA9-7FFE-4543-8508-343B678CA4EA

Fig. 3

Type material. ***Holotype.*** • ♀, **China, Guangxi**, Fangchenggang: Nianwen Village, 24.9232°N, 103.1089°E, 2023.VII.6, coll. Yanzhao Liang.

Paratypes. • 3 ♀♀, **China, Guangxi**, Fangchenggang, Nianwen Village, 24.9137N, 103.1152E, 2024.V.3 (1 ♀), 2023.IX.6 (2 ♀♀), coll. Yanzhao Liang; 1 ♀,

China, Guangxi, Guilin, Baiyunguan, 25.3160°N, 110.3390°E, 2023.IX.6, coll. Jun Li; • 1 ♀, **China, Fujian**, Yongan, Shangping Village, 25.9833°N, 117.3821°E, 2021. VII.12, coll. Yu Lan. All type specimens are deposited in the Insect Collection of Yunnan Agricultural University, Kunming, P. R. China (YNAU).

Diagnosis. The new species resembles *A. longiabdominalis* Wu & Chou, 1985 in having frontal carina not extended or enclosed into an elliptical, mid and hind femora red, and fore wings with three submarginal cells. It differs by the following characteristics (characters of *A. longiabdominalis* in parentheses): anterior margin of clypeus with five teeth (anterior margin of clypeus with three teeth); scutum with sparse, large punctures (scutum nearly without punctures); sternaulus present, short and narrow (sternaulus absent); wings hyaline, proximal part of forewing with dark brown marking (wings hyaline, entirely smoky brown); mandible dark brown, with apex and inner edge reddish-brown (mandible entirely red).

Description of female. Body length 22–31 mm. Body with dark metallic blue-green and purple luster. Mandible dark brown, with apex and inner edge reddish-brown. Antennae black. Wings hyaline, veins and stigma dark brown, proximal part of forewing with dark brown marking. Mid and hind femora red except for distal part; tarsi dark brown. Clypeus, prosternum, mesosternum and upper part of lateral surface of propodeum densely covered with slivery pubescence.

Head. Mandible sharp at apex; inner edge blade-like, without inner teeth (Fig. 3B). Clypeus beak-like, anterior margin with five teeth (Fig. 3B). Terminal segment of labial palpus setose. Frons with dense, fine punctures; frontal carina originating from each frontal lobe present, not extended or enclosed into an elliptical (Fig. 3B). Frontal line long, complete (Fig. 3B). Vertex and gena with sparse, large punctures and dense, fine punctures (Fig. 3C). Ratio of EW: ID = 31: 19. Ratio of F1: (F2+F3) = 32: 37.

Mesosoma. Pronotal collar nearly rectangular, with dense, fine punctures and sparse, midsized punctures; median longitudinal groove narrow and shallow (Fig. 3D); propleurum with dense, fine punctures and one transverse, narrow groove on each side (Fig. 3E); prosternum with dense, fine punctures. Scutum with sparse, large punctures and dense, fine punctures; notaulus narrow and short, not extending to posterior margin, not crenulate (Fig. 3D). Mesopleuron and mesosternum with sparse, large punctures and dense, fine punctures (Fig. 3F). Omaulus not crenulate (Fig. 3F). Sternaulus short, not crenulate (Fig. 3F). Scutellum with dense, fine punctures and sparse, large punctures; anterior margin with one transverse, crenulate groove (Fig. 3D). Metanotum with dense, fine punctures (Figs 3D, G). Propodeal enclosure approximately trapezoid, medially with five strong, longitudinal carinae, including one median longitudinal carina, two strong, oblique, longitudinal carinae on either side, and two oblique, longitudinal carinae located further out to sides; numerous nearly parallel transverse rugae connected five carinae and edge carinae on either side, forming distinct, regular reticulation except posterior central part with irregular reticulation (Fig. 3G). Posterior surface of propodeum with distinct, irregular reticulation. Upper part of lateral surface of propodeum with irregular reticulation, rest with sparse, large punctures and dense, fine punctures (Fig. 3F). Four propodeal posterior lateral angles evident (Fig. 3G).

Figure 3. *Ampulex genapunctata* Liu & Li, sp. nov. Female. Holotype **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

Wings and legs. Fore wings with three submarginal cells, vein 1rs-m complete, vein M+Cu diverging at crossvein cu-a. Hind wings with vein M+Cu diverging before crossvein cu-a (Fig. 3H). Claws bifid (Fig. 3I).

Metasoma. T1-T2 with sparse, fine punctures; T3 with dense, large punctures; T4-T6 alutaceous. T2 with one transverse groove near anterior margin. Metasomal apex laterally compressed.

Male. Unknown.

Distribution. China (Guangxi, Fujian).

Etymology. The specific name *genapunctata* originates from the Latin word "*gena*" and "*punctata*", refers to the gena with sparse, large punctures.

3. *Ampulex rubifemoralis* Liu & Li, sp. nov.

https://zoobank.org/C50780FE-1EE8-4879-99E2-F48B195C3228

Figs 4, 5

Type material. ***Holotype.*** • ♀, **China, Yunnan**, Wenshan, Maguan County, Donggualin Village, 24.9002°54'N; 104.0828°E, 2017.VII.11, coll. Dan Yue.

Paratypes. • 2 ♂♂, same data as holotype; • 1 ♂, **China, Yunnan**, Xishuangbanna, Mengla County, Baka Village, 21.9319°N, 101.2091°E, 2007.IV.30, coll. Guohua Chen. All type specimens are deposited in the Insect Collection of Yunnan Agricultural University, Kunming, P. R. China (YNAU).

Diagnosis. The new species resembles *A. rotundioculus* Wu & Chou, 1985 in having body surface entirely black except female mandible red, and median longitudinal groove of pronotum narrow and shallow. It differs by the following characteristics (characters of *A. rotundioculus* in parentheses): female compound eye large and oval-shaped (female eye small and nearly round); posterior surface of propodeum, dorsal hind coxa and female T3 densely covered with silvery setae (posterior surface of propodeum, dorsal hind coxa and female T3 densely covered without silvery setae); mid and hind femora red (mid and hind femora black); anterior half of scutum without median longitudinal groove (anterior half of scutum with a median longitudinal groove); female pronotum without punctures (female pronotum with large punctures).

Description of female. Body length 16 mm. Body entirely black. Anterior margin of clypeus and mandible red. Wings hyaline, veins and stigma dark brown, proximal part of forewing with dark brown marking. Mid and hind femora red except for distal part. Head and mesosoma densely covered with pubescence; posterior surface of propodeum, dorsal hind coxa and T3 densely covered with silvery setae.

Head. Mandible sharp at apex; inner edge blade-like, without inner teeth (Fig. 4B). Clypeus beak-like, anterior margin with five teeth (Fig. 4B). Terminal segment of labial palpus setose. Frons alutaceous, with sparse, midsized punctures (Fig. 4B); frontal carina originating from each frontal lobe absent (Fig. 4B). Frontal line absent; frons above base of median ridge of clypeus with one tiny tubercle (Fig. 4B). Vertex alutaceous, with dense, fine punctures (Fig. 4C). Gena alutaceous. Ratio of EW : ID = 23 : 14. Ratio of F1 : (F2+F3) = 16: 13.

Mesosoma. Pronotal collar nearly rectangular, alutaceous, almost not punctate; median longitudinal groove narrow and shallow (Fig. 4D); propleurum alutaceous, with dense, fine punctures and one transverse, narrow groove on each side (Fig. 4E); prosternum with sparse, midsized punctures. Scutum alutaceous, with sparse, fine punctures, center slightly concaved, with several large punctures; notaulus long, extending to posterior

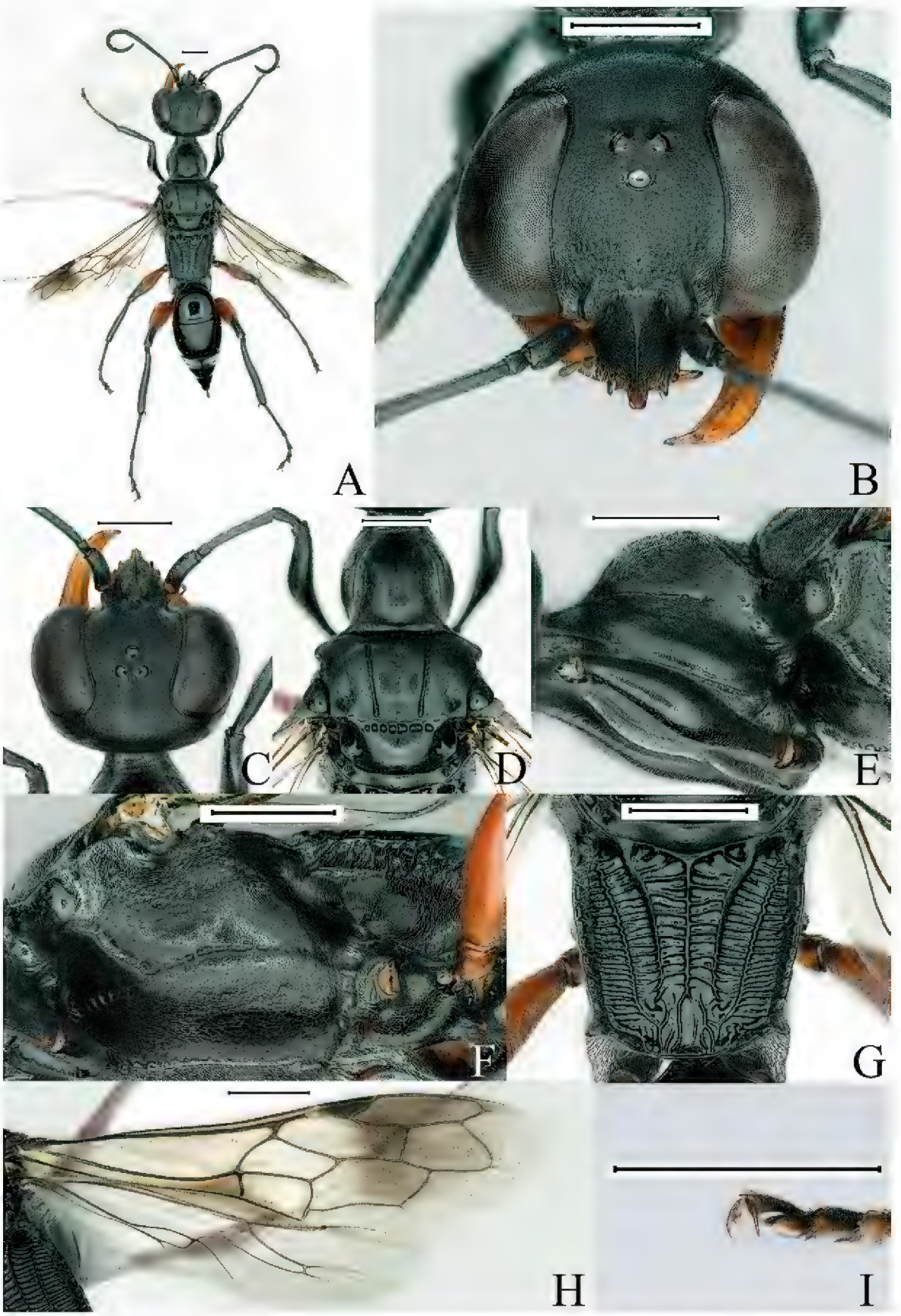

Figure 4. *Ampulex rubifemoralis* Liu & Li, sp. nov. Female. Holotype **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

margin, not crenulate (Fig. 4D). Mesopleuron alutaceous, with dense, large punctures (Fig. 4F). Mesosternum alutaceous, with sparse, fine punctures (Fig. 4F). Omaulus not crenulate (Fig. 4F). Sternaulus present, crenulate (Fig. 4F). Scutellum alutaceous; anterior margin with one transverse, crenulate groove (Fig. 4F). Metanotum alutaceous (Figs 4D, G). Propodeal enclosure approximately trapezoid, medially with five strong, longitudinal carinae, including one median longitudinal carina, two strong, oblique, longitudinal

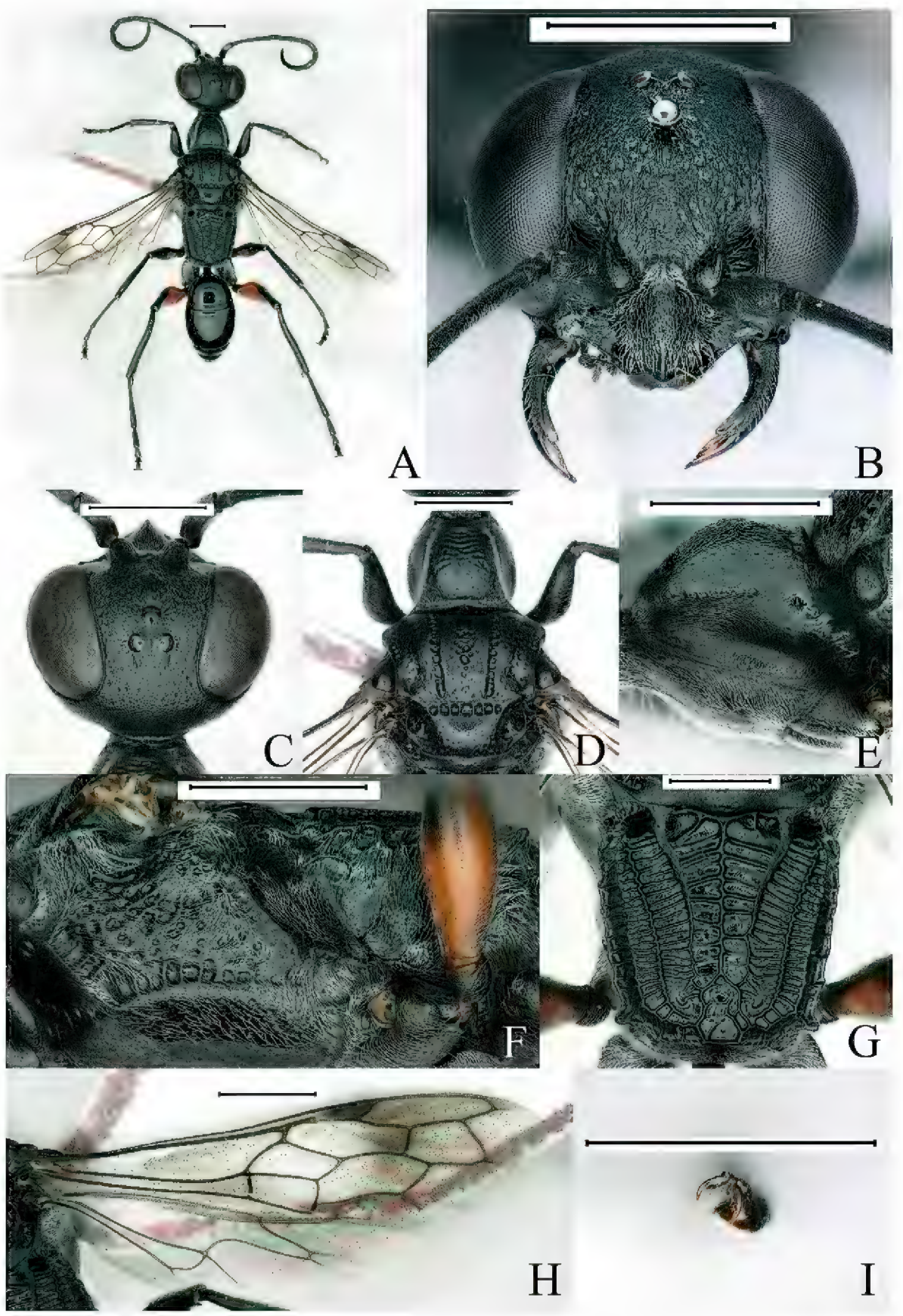

Figure 5. *Ampulex rubifemoralis* Liu & Li, sp. nov. Male. Paratype **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

carinae on either side, and two oblique, longitudinal carinae located further out to sides; numerous nearly parallel transverse rugae connected five carinae and edge carinae on either side, forming distinct, regular reticulation except posterior central part with irregular reticulation (Fig. 4G). Posterior surface of propodeum with distinct, irregular reticulation. Upper part of lateral surface of propodeum with irregular reticulation, rest with sparse, fine punctures (Fig. 4F). Two propodeal posterior lateral angles evident (Fig. 4G).

Wings and legs. Fore wings with two submarginal cells, vein M+Cu diverging at crossvein cu-a. Hind wings with vein M+Cu diverging after crossvein cu-a (Fig. 4H). Claws unidentate (Fig. 4I).

Metasoma. T1-T2 with sparse, fine punctures; T3-T6 alutaceous. T2 with one transverse groove near anterior margin. Metasomal apex laterally compressed.

Male. Differs from female as follows: Body length 7–11 mm. Mandible short, black, with one small, blunt inner tooth near apex (Fig. 5B). Clypeus approximately trapezoidal, anterior margin truncate, with one blunt tooth medially (Fig. 5B). Terminal segment of labial palpus normal. Frons with dense, large punctures, and approximately irregular reticulation (Fig. 5B). Ratio of EW: ID = 31: 49. Ratio of F1: (F2+F3) = 14: 13. Pronotal collar with dense, large punctures (Fig. 5D). Scutum and mesopleuron with larger punctures than female (Figs 5D, F). Sternaulus broader than female (Fig. 5F). Red area of mid femora relatively small (Fig. 5A). Hind wings with vein M+Cu diverging at crossvein cu-a (Fig. 5H). Metasomal apex not compressed laterally (Fig. 5A); T3 not covered with silvery setae (Fig. 5A).

Distribution. China (Yunnan).

Etymology. The specific name *rubifemoralis* originates from the Latin stem "*rub-*" and "*femur*", with the ending "*alis*" meaning "belonging to", refers to the red mid and hind femora.

4. *Ampulex tridentata* Tsuneki, 1982

Figs 6, 7

Ampulex dentata: Yasumatsu, 1935: 34 (Japan: Ryukyu Archipelago: Island of Ishigaki), corrected to *Ampulex tridentata* by Tsuneki, 1982: 16.

Ampulex tridentata Tsuneki, 1982: 16, ♀, ♂. Holotype: ♀, Ryukyu islands: Yayeyama islands (Ent. Inst. Hokkaido Univ., Sapporo).

Material examined. • 2 ♀♀ 3 ♂♂, **China, Zhejiang**, Hangzhou, Linan District, Western Tianmu Mountain, 30.3757°N, 119.4788°E, 2023.VIII.8, coll. Longyuan Cheng; • 1 ♀, **China, Guangdong**, Shaoguan, Ruyuan County, Nan Mountain, 24.9736°N, 113.0335°E, 2004.IV.16, coll. Zaifu Xu.

Description of female. Body length 18–23 mm. Body with metallic blue-green and purple luster. Mandible dark brown, with apex reddish-brown. Antennae black. Wings hyaline, smoky brown; veins and stigma dark brown. Tarsi dark brown. Head and scutum with sparse setae; prosternum, mesopleuron and mesosternum densely covered with long white setae

Head. Mandible sharp at apex; inner edge blade-like, without inner teeth (Fig. 6B). Clypeus beak-like, anterior margin with three teeth (Fig. 6B). Terminal segment of labial palpus normal. Frons with dense, fine punctures; frontal carina originating from each frontal lobe present, not extended or enclosed into an elliptical area (Fig. 6B). Frontal line long, incomplete (Fig. 6B). Vertex with median longitudinal groove, with

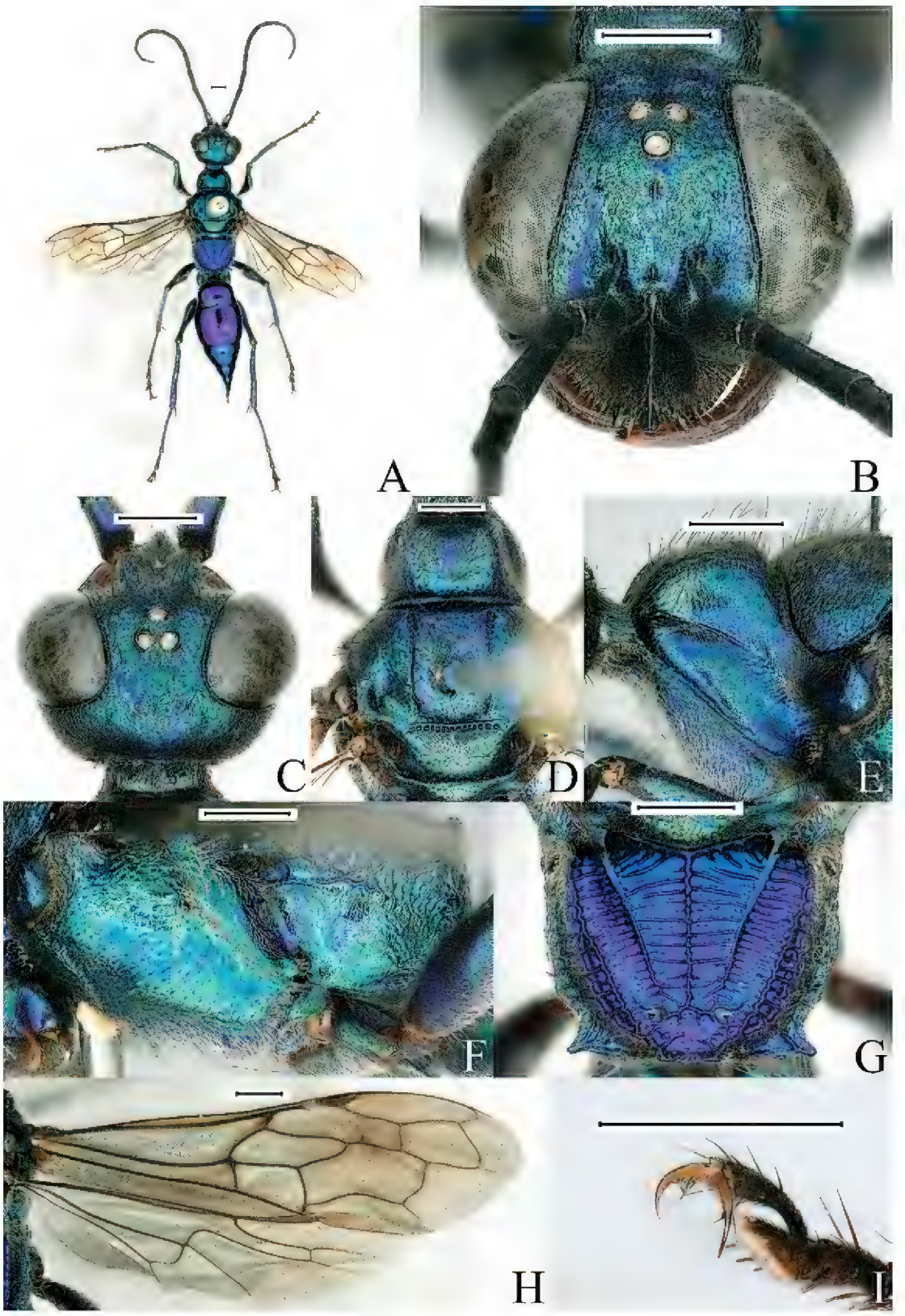

Figure 6. *Ampulex tridentata* Tsuneki, 1982. Female **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

dense, fine punctures (Fig. 6C). Gena with dense, fine punctures. Ratio of EW: ID = 28: 15. Ratio of F1: (F2+F3) = 18 : 29.

Mesosoma. Pronotal collar nearly square, with dense, fine punctures and sparse, midsized punctures (Fig. 6D); propleurum with dense, fine punctures, one transverse, narrow groove and several short oblique rugae posteriorly on each side (Fig. 6E); prosternum with dense, fine punctures and large punctures. Scutum with dense, fine punctures and sparse, midsized punctures; notaulus long, extending to posterior

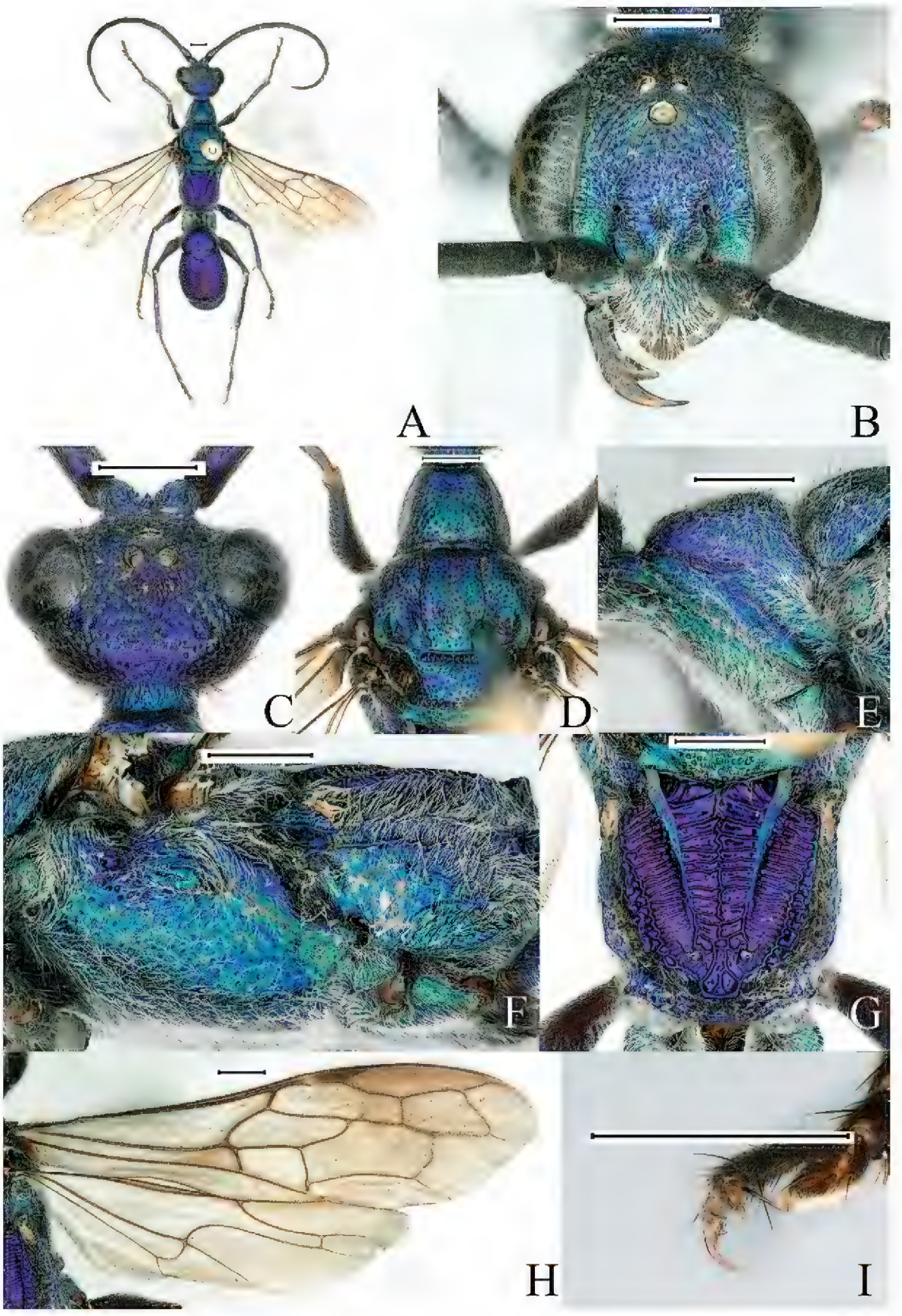

Figure 7. *Ampulex tridentata* Tsuneki, 1982. Male **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

margin, not crenulate (Fig. 6D). Mesopleuron and mesosternum with dense, fine punctures and sparse, midsized punctures (Fig. 6F). Sternaulus absent (Fig. 6F). Scutellum with dense, fine punctures and sparse, midsized punctures; anterior margin with one transverse, crenulate groove (Fig. 6D). Metanotum with dense, fine punctures and sparse, midsized punctures (Figs 6D, G). Propodeal enclosure approximately trapezoid, medially with five strong, longitudinal carinae, including one median

longitudinal carina, two strong, oblique, longitudinal carinae on either side, and two serrated oblique, longitudinal carinae located further out to sides, numerous nearly parallel transverse rugae connected five carinae and edge carinae on either side, forming distinct, regular reticulation except posterior central part with irregular reticulation; transverse rugae incomplete between two oblique, longitudinal carinae on both sides (Fig. 6G). Posterior surface of propodeum with distinct, irregular reticulation. Upper part of lateral surface of propodeum with irregular reticulation, rest with sparse, fine puncture (Fig. 6F). Two propodeal posterior lateral angles evident (Fig. 6G).

Wings and legs. Fore wings with three submarginal cells, vein 1rs-m incomplete; vein M+Cu diverging before crossvein cu-a. Hind wings with vein M+Cu diverging after crossvein cu-a (Fig. 6H). Claws unidentate (Fig. 6I).

Metasoma. T1-T2 with sparse, fine punctures; T3-T6 with dense, fine punctures. T2 with one transverse groove near anterior margin. Metasomal apex laterally compressed.

Male. Differs from female as follows: Body length 18–20 mm. Mandible short, black, with one big inner tooth (Fig. 7B). Clypeus approximately trapezoidal, covered with dense, white long setae; anterior margin arc-shaped, with one distinct tooth medially (Fig. 7B). Frons with dense, large punctures, and approximately irregular reticulation (Fig. 7B). Ratio of EW: ID = 17: 24. Ratio of F1: (F2+F3) = 17: 29. Vertex, gena, pronotal collar, prosternum, scutum, mesopleuron, mesosternum, scutellum and metanotum with dense, large punctures (Figs 7B-F). Propleurum with more and longer oblique rugae posteriorly on each side than female (Fig. 7E). Propodeal enclosure with transverse rugae completely between two oblique, and longitudinal carinae on both sides (Fig. 7G). Lateral surface of propodeum almost entirely with irregular reticulation (Fig. 7F). Hind wings with vein M+Cu diverging at crossvein cu-a (Fig. 7H). Metasomal apex not compressed laterally (Fig. 7A); T1-T3 with dense, large punctures.

Distribution. Japan, China (Guangdong, Zhejiang). New record from China.

5. *Ampulex clypecomplana* Chen & Li, 2010

Figs 8, 9

Ampulex clypecomplana Chen & Li, 2010: 44. Holotype: ♂, China, Yunnan, Mengzi County, Baimengkong Village (Yunnan Agricultural University).

Material examined. • 5 ♀♀, **China, Yunnan**, Kunming, Yiliang County: Duanguan Village, 24.9174°N, 103.1158°E, 2021.VII.15, coll. Zhizhi Liu; • 13 ♂♂, **China, Yunnan**, Kunming, Yiliang County, Duanguan Village, 24.9477°N, 103.1636°E, 2021.VI.18, coll. Zhizhi Liu; • 4 ♀♀ 17 ♂♂, **China: Yunnan**, Wenshan, Qiubei County, Shuanglongying Village, 24.2848°N, 104.1832°E, 2013.VI.7, coll. Guohua Chen.

First description of female. Body length 14–23 mm. Body with metallic blue-green. Mandible dark brown, with apex reddish-brown. Antennae black. Wings hyaline, smoky brown; veins and stigma dark brown. Hind femora red except for distal part; tarsi black. Head and scutum with sparse setae; prosternum, mesopleuron and mesosternum densely covered with long setae.

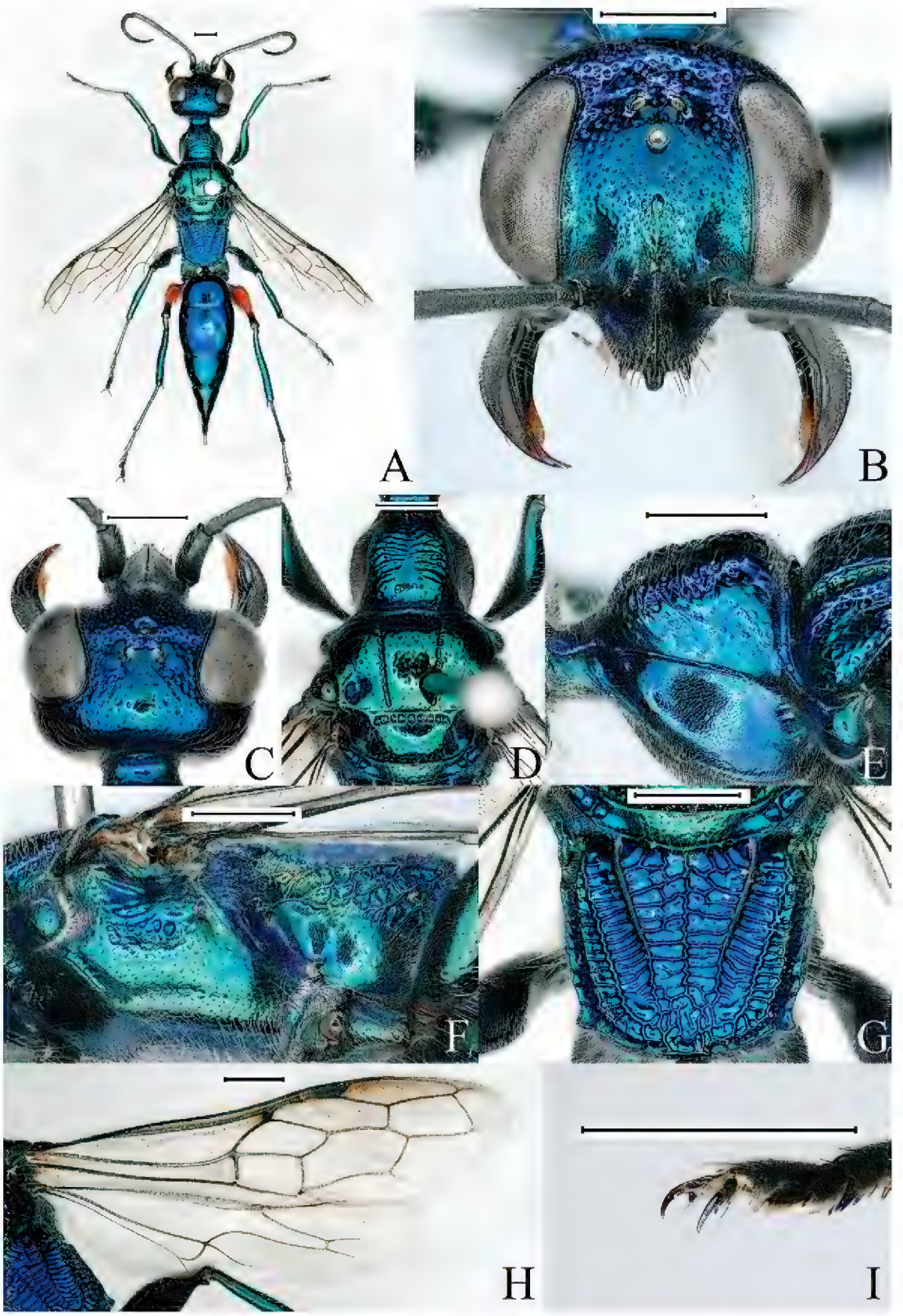

Figure 8. *Ampulex clypecomplana* Chen and Q. Li, 2010. Female **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

Head. Mandible sharp at apex; inner edge blade-like except apex; without inner teeth (Fig. 8B). Clypeus beak-like, anterior margin with three teeth (Fig. 8B). Terminal segment of labial palpus setose. Frons with sparse, midsized punctures; frontal carina originating from each frontal lobe absent (Fig. 8B). Frontal line short, incomplete (Fig. 8B). Vertex with sparse, large punctures (Fig. 8C). Gena with sparse, midsized punctures. Ratio of EW: ID = 33: 24. Ratio of F1: (F2+F3) = 24: 19.

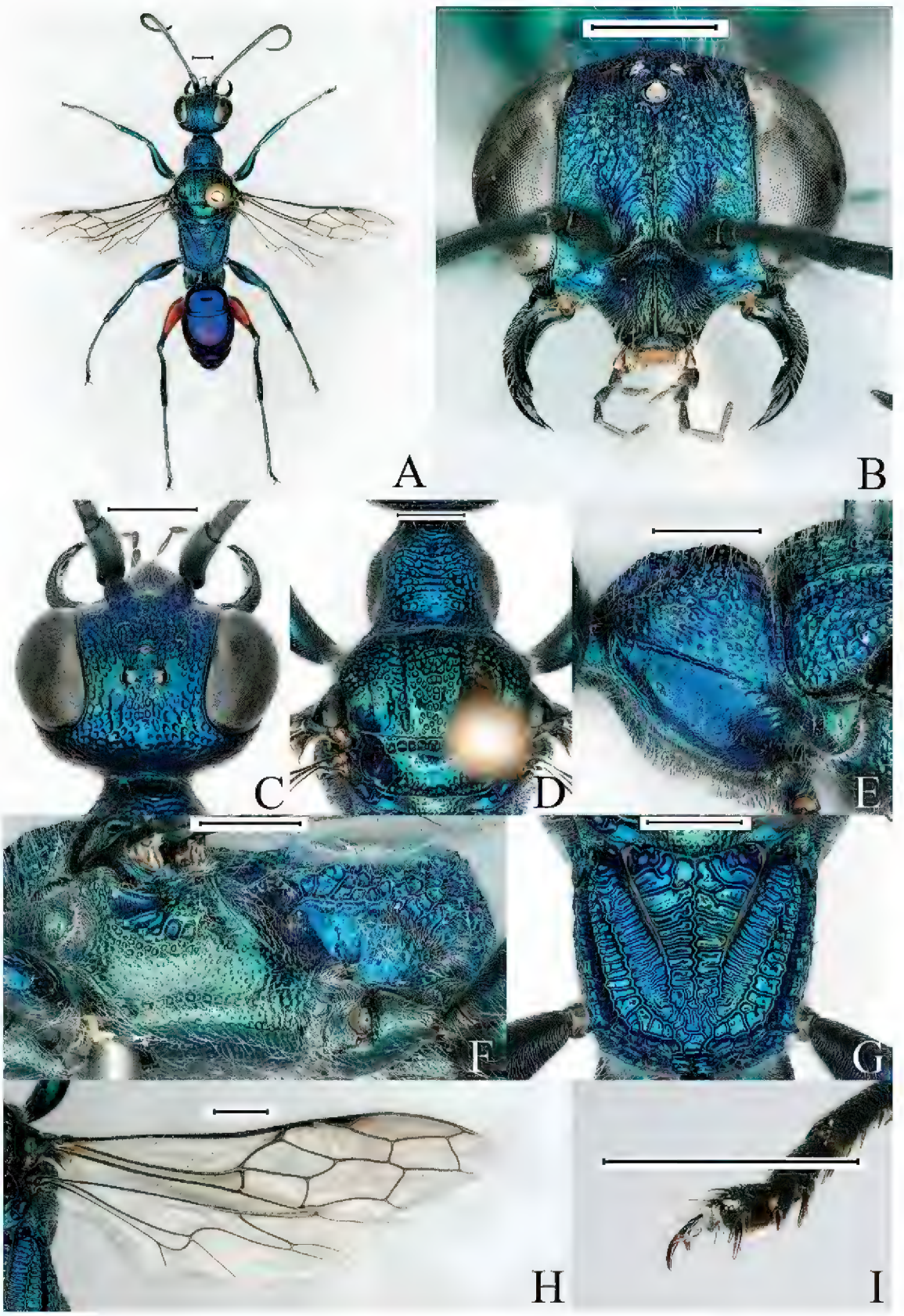

Figure 9. *Ampulex clypecomplana* Chen and Q. Li, 2010. Male **A** habitus, dorsal view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propleurum, lateral view **F** thorax, lateral view **G** propodeum, dorso-posterior view **H** fore and hind wings **I** claw, lateral view. Scale bars: 1.0 mm.

Mesosoma. Pronotal collar nearly rectangular, with several transverse rugae and large punctures; median longitudinal groove shallow (Fig. 8D); propleurum with dense, fine punctures and one transverse, narrow groove on each side (Fig. 8E); prosternum alutaceous, with sparse, midsized punctures. Scutum with sparse, large punctures; notaulus long, extending to posterior margin, crenulate (Fig. 8D). Mesopleuron with dense, large punctures and sparse, small punctures (Fig. 8F). Mesosternum alutaceous, with

sparse, fine punctures and sparse, midsized punctures (Fig. 8F). Omaulus not crenulate (Fig. 8F). Sternaulus present, crenulate (Fig. 8F). Scutellum with sparse, midsized punctures; anterior margin with one transverse, crenulate groove (Fig. 8D). Metanotum with dense, fine punctures and sparse, midsized punctures (Figs 8D, G). Propodeal enclosure approximately trapezoid, medially with five strong, longitudinal carinae, including one serrated median longitudinal carina, two strong, oblique, longitudinal carinae on either side, and two serrated oblique, longitudinal carinae located further out to sides; numerous nearly parallel transverse rugae connected five carinae and edge carinae on either side, forming distinct, regular reticulation except posterior central part with irregular reticulation (Fig. 8G). Posterior surface of propodeum with distinct, irregular reticulation. Upper part of lateral surface of propodeum with irregular reticulation, rest with sparse, fine punctures (Fig. 8F). Two propodeal posterior lateral angles evident (Fig. 8G).

Wings and legs. Fore wings with two submarginal cells, vein M+Cu diverging before crossvein cu-a. Hind wings with vein M+Cu diverging at crossvein cu-a (Fig. 8H). Claws unidentate (Fig. 8I).

Metasoma. T1-T3 with sparse, fine punctures; T4-T6 alutaceous. T2 with one transverse groove near anterior margin. Metasomal apex laterally compressed.

Male. Differs from female as follows: Body length 7–17 mm. Mandible short, black, with one small, blunt inner tooth near apex (Fig. 9B). Clypeus approximately trapezoidal, anterior margin truncate, with one blunt tooth medially (Fig. 9B). Terminal segment of labial palpus normal. Frons with dense, large punctures, and approximately irregular reticulation (Fig. 9B). Ratio of EW : ID = 34 : 25. Ratio of F1 : (F2+F3) = 23 : 18. Vertex, gena, pronotal collar, prosternum, scutum, mesopleuron, mesosternum with scattered, midsize punctures (Figs 9B-F). Hind wings with vein M+Cu diverging before crossvein cu-a (Fig. 9H). Metasomal apex not compressed laterally (Fig. 9A).

Distribution. China (Yunnan).

Acknowledgements

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Appendix 1

Checklist of Chinese species of the genus *Ampulex* Jurine, 1807

All records for *Ampulex* species reported from China are presented here, organized alphabetically by species epithet. Each species record consists of the Chinese Province or other country for which a voucher specimen or verifiable observational record had been confirmed.

1. *Ampulex albobarbata* Tsuneki, 1982 – China: Taiwan.
2. *Ampulex alisana* Tsuneki, 1967 – China: Taiwan.
3. *Ampulex bidenticollis* Tsuneki, 1967 – China: Taiwan.
4. *Ampulex clypecomplana* Chen and Q. Li, 2010 – China: Yunnan.
5. *Ampulex compressa* (Fabricius, 1781) – China: Yunnan, Guangdong, Guangxi, Fujian, Hainan, Hunan, Hongkong, Macao; South Asia, Africa, Australia, Parts of the Americas.
6. *Ampulex cuprea* F. Smith, 1856 – China: Hongkong.
7. *Ampulex dentata* Matsumura & Uchida, 1926 – China: Sichuan; Japan.
8. *Ampulex difficilis* Strand, 1913 – China: Taiwan, Guangdong.
9. *Ampulex dissector* (Thunberg, 1822) – China: Yunnan, Guangdong, Guangxi, Hainan, Taiwan, Sichuan, Guizhou, Zhejiang, Fujian, Shaanxi; Japan, Korea, India.
10. *Ampulex esakii* Yasumatsu, 1936 – China: Taiwan.
11. *Ampulex fronticarinalis* Liu & Li, sp. nov. – China: Yunnan.
12. *Ampulex genapunctata* Liu & Li, sp. nov. – China: Guangxi, Fujian.
13. *Ampulex kurarensis* Yasumatsu, 1936 – China: Sichuan, Guangxi, Zhejiang, Fujian, Hunan; Korea.
14. *Ampulex latifrons* Kohl, 1893 – China: Guangdong; India.
15. *Ampulex longiabdominalis* Wu & Chou, 1985 – China: Zhejiang.
16. *Ampulex longiclypeus* Wu & Chou, 1985 – China: Sichuan, Yunnan, Guangxi, Fujian.
17. *Ampulex mirabilis* Berland, 1935 – China: Guizhou.
18. *Ampulex murotai* Tsuneki, 1973 – China: Taiwan.
19. *Ampulex quadraticollar* Wu & Chou, 1985 – China: Yunnan, Guangxi, Guangdong.
20. *Ampulex rotundioculus* Wu & Chou, 1985 – China: Yunnan.
21. *Ampulex rubifemoralis* Liu & Li, sp. nov. – China: Yunnan.
22. *Ampulex sciophanes* (Nagy, 1971) – China: Taiwan.
23. *Ampulex seitzii* Kohl, 1893 – China: Yunnan, Fujian, Guangdong, Hongkong, Taiwan; Indonesia, Laos.
24. *Ampulex sikkimensis* Kriechbaumer, 1874 – China: no specific locality; India.
25. *Ampulex sonani* Yasumatsu, 1936 – China: Taiwan.
26. *Ampulex takeuchii* Yasumatsu, 1936 – China: Zhejiang, Fujian, Hunan, Taiwan.
27. *Ampulex tridentata* Tsuneki, 1982 (new record) – China: Zhejiang, Guangdong; Japan.
28. *Ampulex yunnanensis* Wu & Chou, 1985 – China: Yunnan.